

0.25A LAMP REPLACEMENT USING API FA-249 LANTERNS & STABRITE LED RETROFIT KITS, AND SEALITE SL125 MARINE LANTERN INSTALLATION & SERVICING INSTRUCTIONS

The Coast Guard embarked on a program to eliminate 12-volt, 0.25-ampere lamps from its inventory by converting all floating, fixed aids and ranges using this lamp to LEDs. Sixty Floating aids were converted to the Carmanah 700 series lanterns, which are discussed on a separate instruction sheet available on our website: www.uscg.mil/systems/gse/gse2 (look under Products/Services, Technical Data Sheet Carmanah 700 series LED Lantern). 350 fixed aids were converted to API's StaBrite kits in 155mm lanterns. Ranges using 250mm lanterns without condensing panels will use the Sealite SL125 lantern. 250mm lanterns with condensing panels will be upgraded to use 0.55a lamps after careful review of the aid's solar design and range design.



FA-249 with StaBrite



Sealite SL125

Selection/Identification

The StaBrite LED assembly is a versatile device that mimics an incandescent lamp when used in a lantern. Omnidirectional lanterns like the FA-249 (155mm) require a StaBrite assembly that has 4 LEDs and a frosted sleeve. This ensures that there is adequate light output at all points on the horizon without "dark spots" between the LEDs. StaBrite assemblies for these lanterns are designated "1x4 LED." NOTE: the StaBrite assemblies for the 4 nautical mile lanterns distributed for a field test in 2002 contain "3x4 LED" assemblies. These lanterns have a higher output and power consumption than the 1x4 assemblies, but they also have a very high vertical divergence (beam spread) that is unnecessary on structures.

The Sealite SL125 is a replacement LED lantern intended to replace existing 250mm lanterns using 0.25a lamps. The intensity and flash rhythm are programmable.

Programming

The LED assemblies must be programmed to the proper flash rhythm before deployment. The beacons shall be programmed and bench tested in the shop prior to transit to the aid.

(Note: the cap on the StaBrite assembly above the sleeve and the base assembly on the Sealite determines the signal color)

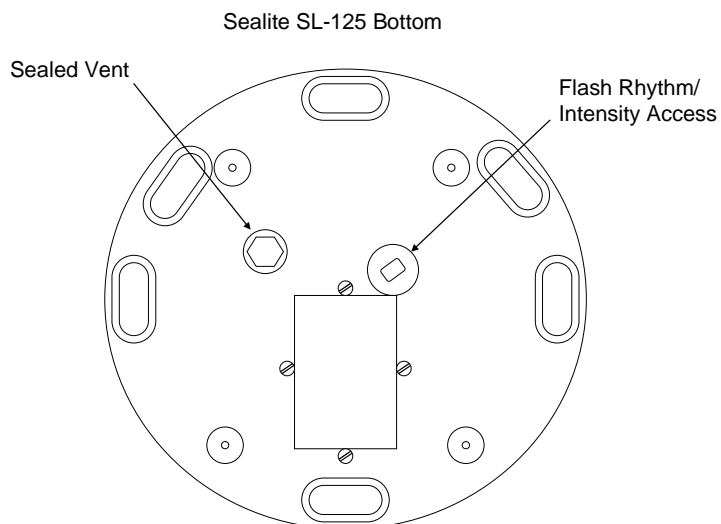
FA-249 (155mm) Lantern

Open the lantern by loosening the three knobs securing the lens to the base. Determine the desired switch position using the chart on the side of the StaBrite housing. Turn the knob on the opposite side to the proper flash rhythm (characteristic).

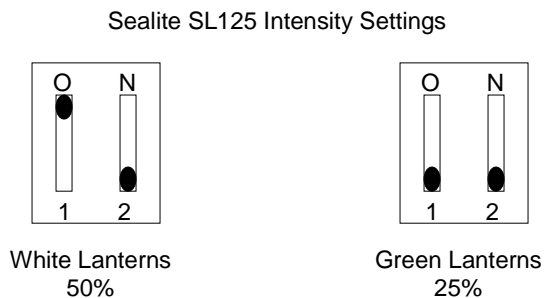
Visually note if the StaBrite assembly is located in the center of the lantern and not leaning to one side. If the lantern bracket is bent, replace it with a standard 155mm bracket. Close the lantern and secure by tightening the three knobs on the lens ring.

Sealite SL125 Lantern

The flash rhythm and intensity settings are programmed by removing the access plug in the base of the lantern (see below):

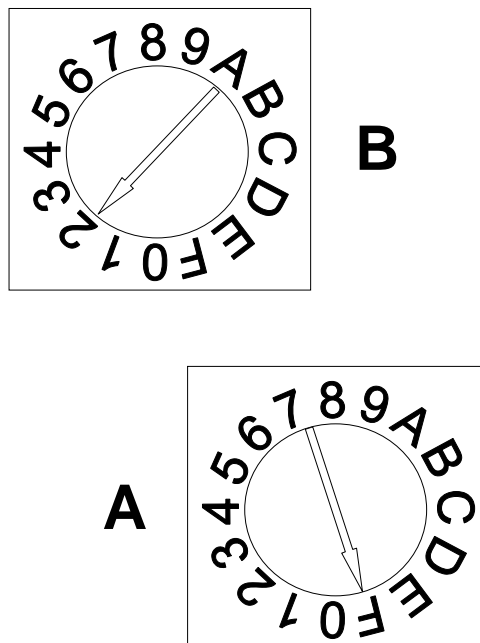


The intensity settings are programmed via dip switches located near two rotary switches used to program the flash rhythm. Use a ballpoint pen to change the dip switch settings. White lanterns shall be set to 50% intensity and green lanterns to 25%, as shown below:



The flash rhythm is set using the two rotary switches accessible through the access plug. Each switch has a selector with a pointer on it to indicate position. Use a small screwdriver to turn the rotary dial to align the arrow with the proper letter/number. Switches are labeled “A” and “B” on the circuit board, as shown below:

Flash Rhythm Rotary Switches



Flash rhythm switch position settings are listed below. In the example shown above, the lantern is set to display an “Oc 4” rhythm.

Switch		Flash
A	B	Rhythm
0	0	Fixed
F	2	Oc 4
5	2	Iso 6
1	2	Iso 2
D	6	FL2.5(1)
8	3	Q

Additional flash rhythms are available. Contact COMDT (CG-432A) for details.

Bench Test

FA-249 (155mm) Lantern

Connect power leads to the “B+” and “B-” terminals on the StaBrite assembly. If the lantern is intended to be installed at a location with a **Fixed-On** rhythm, an external daylight control, must be ordered from API (API part number 9001-0317), installed in one

of the unused cable entrances in the base of the lantern and wired to the “P+” (yellow wire) and “P-“ (white wire) terminals on the terminal strip. The internal daylight control is disabled when the Fixed On rhythm is selected. Bench test each assembly with a 12-volt DC power source to ensure proper operation. The recommended interval is 24 hours. Cover the daylight control with black electrical tape for this test. The daylight control is on the sloping face of the StaBrite housing (see below), or at the end of the pipe plug if a Fixed-On rhythm is used. Check to be sure that the lantern is flashing at the desired rhythm. Be sure to remove the black tape before deployment.

Daylight Control

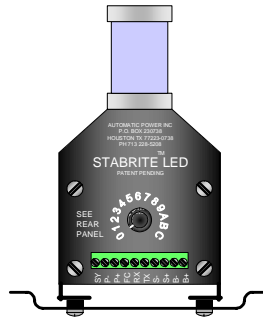


Sealite SL125

Connect a 12 VDC power source to the positive and negative leads from the lantern. Black is positive and white is negative. Cover the lantern with a rag to simulate nighttime and check to see if the lantern flashes on-characteristic. The recommended interval is 24 hours.

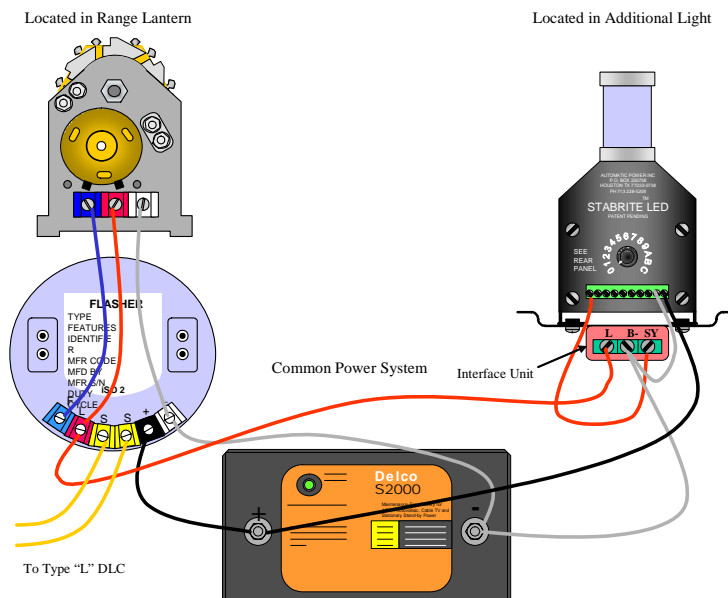
Installation

FA-249/155mm



On range structures where two API FA-249 lanterns are synced together, a single power system must be used, or the negative leads from both power systems must be connected together. A wire must be connected between the “SY” terminals of both StaBrite assemblies. It is preferable to use a shielded wire, 18 AWG or larger with the shield grounded to the structure at one end. Both StaBrite units must be programmed with the same flash rhythm.

On range structures where the API FA-249 is used as an additional light synced to a RL14 or FA-240 using a conventional 12 VDC CG flasher, lampchanger and lamps, an interface device, provided by COMDT (CG-432A) is necessary to synchronize the lights only when they are flashed. The interface device is attached to the base of the StaBrite bracket with Velcro and wired as shown below. A single conductor, 18 AWG or larger wire must be connected to the “L” terminal of the CG-181/481/493 flasher in the range lantern and terminated at the “L” terminal of the interface device. The supplied wires from the “SY” and “B-“ terminals of the interface device are connected to the “SY” and “B-“ terminals on the StaBrite LED unit. A common power system is necessary (or the negative leads from both power systems must be connected together) and the DLC must be operable on both lights.

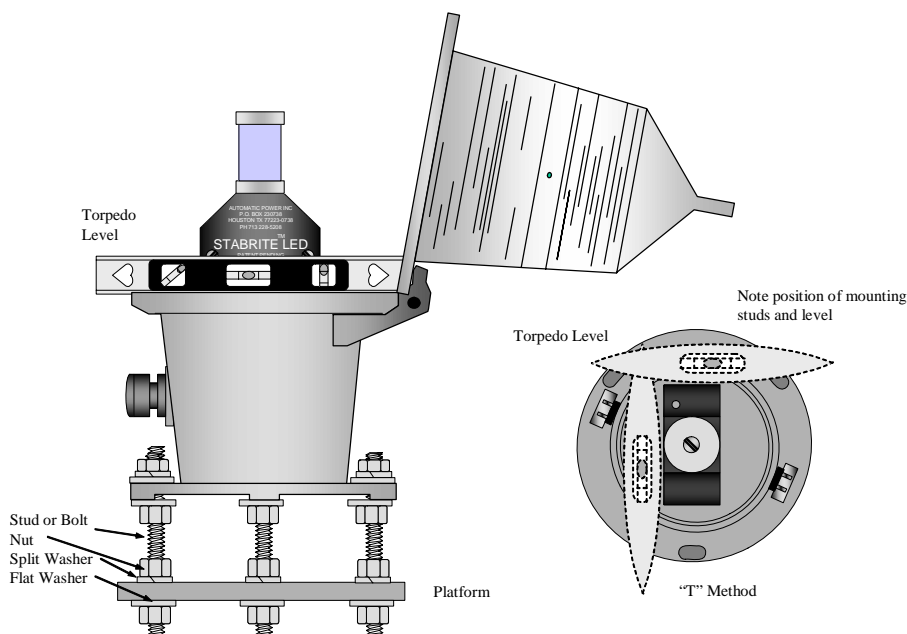


If the flash rhythm is Fixed-On, insert an API daylight control in an unused cable entrance in the base and wire it to the “P+” (yellow wire) and “P-” (white wire) terminals on the terminal strip of the StaBrite LED.

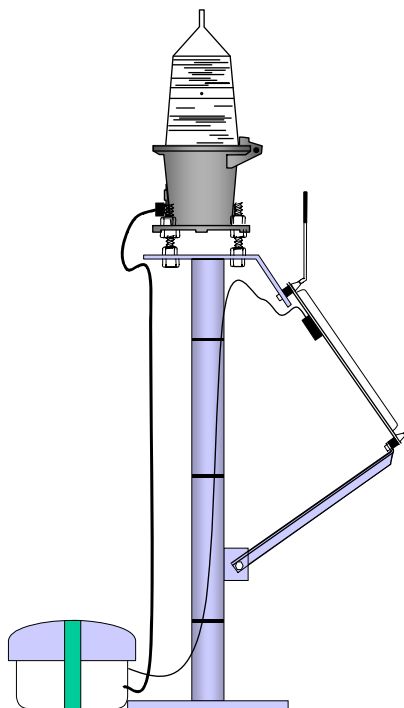
Install 12/2 SO cable through the stuffing tube on the 155mm lantern. Strip 3/8” of insulation from each conductor, twist tightly, and then insert into the terminal strip. The positive lead (black) goes to the “B+” terminal and the negative lead (white) to the “B-” terminal. Be sure that the wire does not fray when inserting it into the terminal block or a short circuit may result.

Install the StaBrite assembly into the FA-249/155mm, secure any lock washers on top of the bracket and tighten the screws.

Mount and level the lantern using three 1/2” stainless steel studs or bolts. Place a torpedo level on the base. Use the “T” method as shown below and adjust the nuts below the base until level. After tightening, recheck using the level in both directions.



The leads from the lantern and solar panel should be terminated in the battery box. The wire on the API beacon may have to be extended/replaced with 12/2 SO if it doesn't reach the battery box. Route the wire and zip tie it along structural members then coil the excess inside the battery box. Crimp the proper ring lug onto each wire, and attach the black leads to the positive terminal on the battery and the white leads to the negative terminal on the battery. Apply No-ox grease or a suitable anticorrosion coating to the battery terminals.

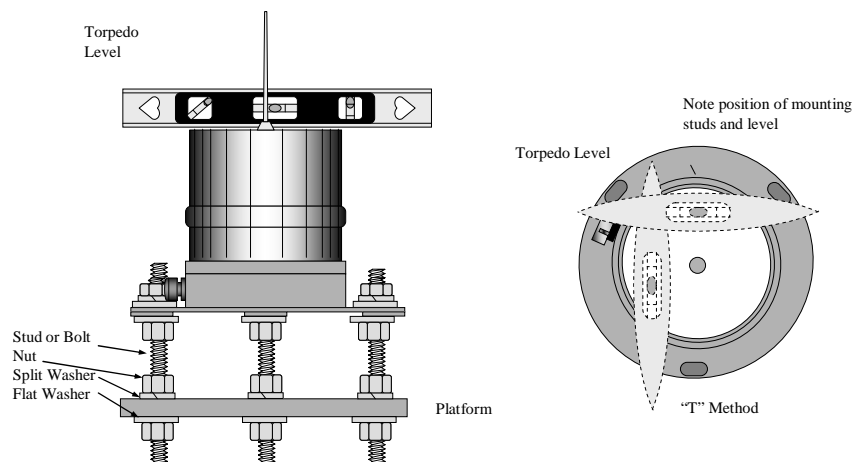


Cover the daylight control and check for proper operation.

Close the lantern and secure with the knurled screws.

Sealite SL125

Mount and level the lantern using three ½" stainless steel studs or bolts. Place a torpedo level on the top of the lens (press down gently to remove any bow in the lens top). Use the "T" method as shown below and adjust the nuts beneath the base until level. After tightening, recheck using the level in both directions.



The power cable is a fixed length, but can be replaced. If the cable must be extended, you will use a LED Junction Box available from the COMDT (CG-432A). Contact Son Nguyen (son.t.nguyen@uscg.mil) if you need one. Procedures for replacing the cable are in the Servicing section.

The leads from the lantern and solar panel should be terminated in the battery box. Route the wire and zip tie it along structural members then coil the excess inside the battery box. Crimp the proper ring lug onto each wire, and attach the black leads to the positive terminal on the battery and the white leads to the negative terminal on the battery. Apply No-ox grease or a suitable anticorrosion coating to the battery terminals.

Cover the daylight control (top of lantern) and check for proper operation.

Intensity, Power Level and Power Consumption

FA-249 Lantern with StaBrite LED

Intensity (candela)

Rhythm	White	Yellow	Red	Green
Fixed	60 (candela)	26	49	41
Oc 4, Iso 6	57	28	50	38
Iso 2, FL2.5(1), FL4(1), FL2(6)	55	29	48	35
FL6(.6)	52	30	48	32
FL4(.4), FL2(5), Mo(A)	45	25	41	29
Q, FL2.5(.3), FL6(2+1), IQ	41	23	37	26

The intensities are conservative and in some cases seem incorrect (i.e., Oc 4 is higher than Fixed). The fixed intensities are reduced due to the effects of heat. Although these lanterns will appear brighter than the 0.25a lamps they replaced, this will ensure that the advertised intensity will be present over the projected service life (10 years). These intensities are for clear lenses only.

Power Consumption

White – 0.33 amps

Yellow – 0.34 amps

Red – 0.29 amps

Green – 0.29 amps

Solar Sizing – Most red and green lanterns will use the same power system as a 0.25a lamp. The solar design program should be run for all installations to ensure adequate power is generated by the existing system. The “LED load” is entered as stated above; the current is the same regardless of rhythm. The applicable duty cycle must be entered and there is no flasher load, as shown in the example:

Load	Amps?	Duty Cycle (10=10%)	D, N, or DN	Operate (if < 24)	Interval Number:	Interval Number:
FA-249 White FL4(.4)	0.33	10	N			
Number of Flashers:	0					

Solar Design Program Sample Input

Sealite SL125**Intensity (candela)**

	SL125		250mm/0.25a lamp for comparison	
Rhythm	White	Green*	White	Green
Fixed	87 (candela)	17	70	20
Oc 4, Iso 6	81	16	65	20
Iso 2, FL2.5(1)	72	14	55	20
Q	52	10	40	10

*The 25% power setting matches the intensity of the green 250mm pretty well. If additional intensity is desired, the power setting can be changed to 50% which will increase the above values by a factor of 3 (i.e., 17 candela x 3 = 51 candela). Power consumption is the same as the white lantern at this power setting.

Power Consumption

White – 0.24 amps

Green – 0.10 amps

Solar Sizing – White and green lanterns will use the same power system as a 0.25a lamp. If the present solar sizing exceeds 10 watts/100 amp-hours for green lanterns, run the solar design program to see if the sizing can be reduced. The “LED load” is entered as stated above; the current is the same regardless of rhythm. The applicable duty cycle must be entered and there is no flasher load, as shown in the example, below:

Load	Amps?	Duty Cycle (10=10%)	D, N, or DN	Operate (if < 24)	Interval Number:	Interval Number:
SL125 Green, Iso2	0.10	50	N			
Number of Flashers:	0					

Solar Design Program Sample Input

Service Life

The maximum service life is determined by the operational hours of the LEDs and the ability to maintain the advertised intensity over that term, limited by the durability of the lens and base.

FA-249, 1x4 StaBrite LED – 10-12% duty cycle – 20 years

FA-249, 1x4 StaBrite LED– 13-100% duty cycle – 10 years

Sealite SL125 LED – 30-100% duty cycle – 10 years

Servicing

- The lantern shall not be opened on-station as doing so introduces salt air inside it.
- The service interval for aids is three years.
- The service life of the lantern depends on the operational duty cycle and durability of the lantern, discussed above. The lanterns will not burn out, but intensity degrades over time.
- Ensure that the lens is clean, not discolored or crazing. Wipe with a cloth dampened with mild soap and water, if necessary. Replace if not clear or cracks could compromise its strength or light transmission.
- Inspect the wiring and power system in accordance with the Short Range Aids to Navigation Servicing Guide. Load test the battery.
- Cover the lens or cover the daylight control to ensure that the lantern flashes on rhythm. Observe the LEDs around the lantern. Noticeable dark spots indicate that one or more LEDs are out. If one or more LEDs are out the lantern should be replaced at the earliest convenience after posting a local notice to mariners. An easy way to check LED lanterns is to wrap white paper around the lens and observe the light pattern. Dark sectors on the paper indicate failed LEDs (note: failed LEDs are very rare).
- If the lantern fails for any reason, replace it with another LED lantern or a 155mm lantern, conventional programmable flasher, lampchanger, DLC and lamps. Contact COMDT (CG-432A) for its disposition.

Sealite Cable Replacement

The cable can be replaced, but it should be done at a facility that has soldering equipment.

1. Remove the packing nut from the stuffing tube on the lantern.
2. Carefully pull the wires out of the lantern until the jacket clears the stuffing tube, as shown below. Note that black/brown/red are positive, white/blue/green are negative.



3. Unscrew the stuffing tube from the lantern but try not to twist the cable as the tube is removed.
4. Carefully pull the wires out of the lantern. You should see two splices in the cable.
5. Cut the old cable off just inside the splices. Slide the stuffing tube off the old cable.
6. The new cable must not exceed 11/32" diameter (0.345"). Suggested sources are: 18/2 AWG Neoprene Rubber Jacket, 600 VAC Type SOOW McMaster Carr 7081K11 or equivalent. 18AWG wire is sufficient for these lanterns.
7. Enlarge the "fingers" on the stuffing tube with a blunt object as shown below.



8. Slide the packing nut, packing and stuffing tube down the new cable to within 6" of the end of the cable.



9. Strip 3" of the outer jacket from the cable.
10. Use solderless butt connectors (OK) or solder leads with heat-shrink tubing on wires (Preferred).
11. Carefully push wire back into lantern and coat the threads with a thin layer of silicone.
12. Tighten the stuffing tube, but do not twist the cable as the tube is turned.
13. Carefully spread the "fingers" of the stuffing tube and push the packing into the stuffing tube.
14. Slide the cable jacket into the packing inside the stuffing tube. Lubricant may be necessary.
15. Tighten the packing nut on the stuffing tube, as shown below.



Troubleshooting

No light.

- Check battery voltage. Minimum voltage is 10 volts for the LED lanterns to operate. No reduction in LED intensity will occur at this voltage. Replace wire or battery, if necessary.
- Disconnect external daylight control, if equipped. If light operates, replace the daylight control with a new one from API (the CG type-L will not work).
- Disconnect one lead from the battery, wait 10 seconds, then reconnect.
- Replace the LED lantern assembly.

Improper rhythm

- Check the position of the code selection switch.
- If operating in the Fixed-On mode, be sure that an external API daylight control is installed (API only).
- Disconnect one lead from the battery, wait 10 seconds, then reconnect.
- For synchronized lights, be sure that the sync line is connected between the two lanterns. The output from the StaBrite LED Interface should be 3.3-5.0 volts during each flash as measured between the “SY” and “B-“ of the StaBrite LED.
- Replace the LED assembly.

Various LEDs out (dark sectors)

- The FA-249/155mm lantern uses a StaBrite assembly with 4 LEDs. If one or more are out, replace the StaBrite assembly. The Sealite SL125 lantern has 36 equally spaced LEDs. If the light pattern is not consistent, as projected on a sheet of white paper, replace the lantern.

Reporting Requirements

Units and Cutters shall enter the following information into IATONIS so that your district and CG Headquarters can monitor these lanterns. Enter the following data in the fields listed below for these lantern combinations:

	<u>LANTERN TYPE</u>	<u>LAMP TYPE</u>
LED StaBrite 1x4	155	LED STAB 1X4
LED-Carmanah 701	LED CARMANAH 701 SC	LED
LED-Carmanah 702	LED CARMANAH 702 SC	LED
LED-Carmanah 702-5	LED CARMANAH 702-5 SC	LED
LED-Sealite	LED SEALITE SL-125	LED

For the API FA-249 lantern, enter as a 155mm lantern.

In addition, specific problems, concerns, observations and questions may be directed to anyone on the COMDT (CG-432A) staff via the website www.uscg.mil/systems/gse/gse2.